Doing More with Less:
The Role of Energy Efficiency in Agricultural Production

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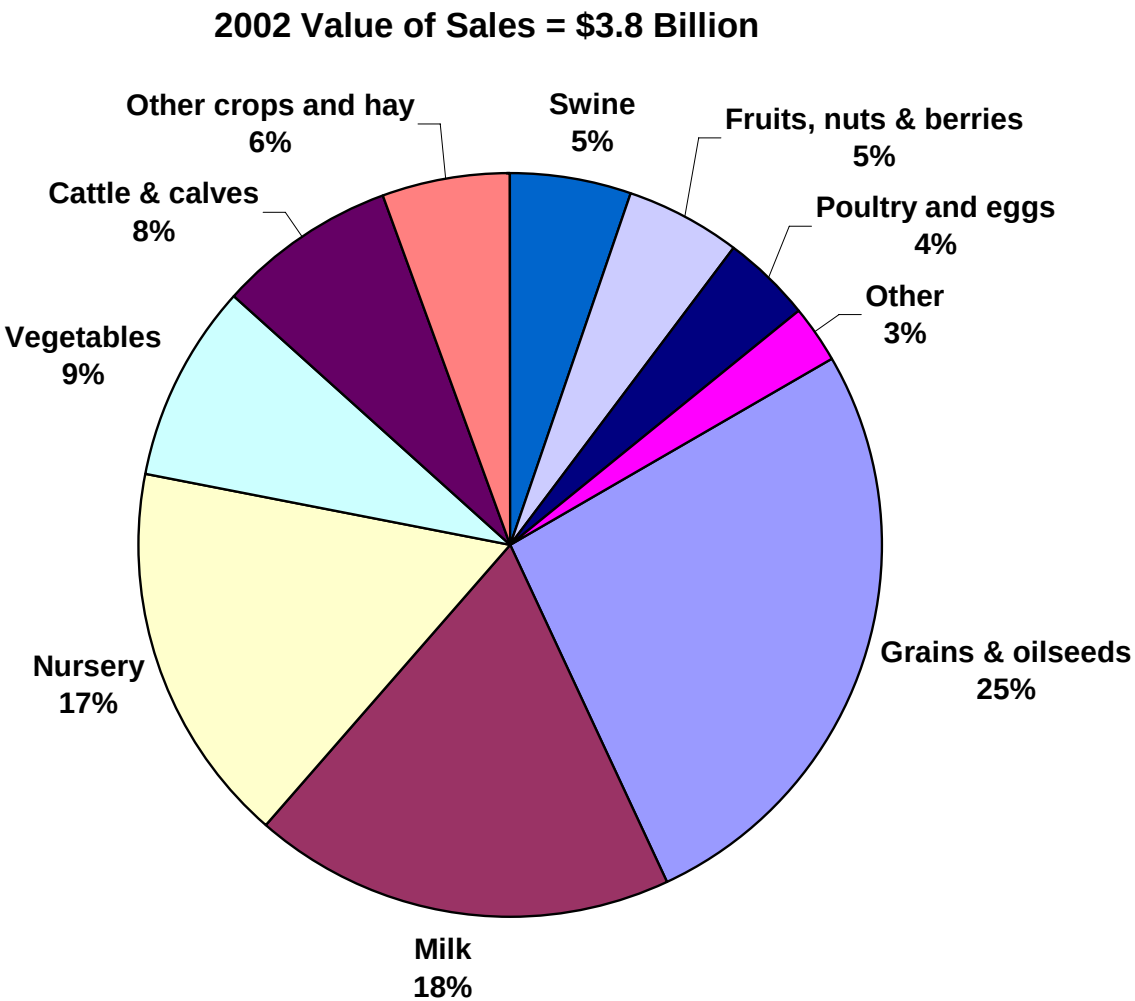
The American Council for an Energy Efficient Economy (ACEEE)

- Non-profit (501c (3)) dedicated to advancing energy efficiency through research and dissemination.
- 25+ staffers in Washington, DC, Delaware, Michigan and Wisconsin
- The Energy Efficiency “Think Tank”
- Internationally Respected Source of Research Focus on End-Use Efficiency, Policy and Programs
- Funding:
  - Foundation and Government Grants (55%)
  - Specific Contract work (20%)
  - Conferences and Publications (25%)

Michigan Ag is Diverse Mix

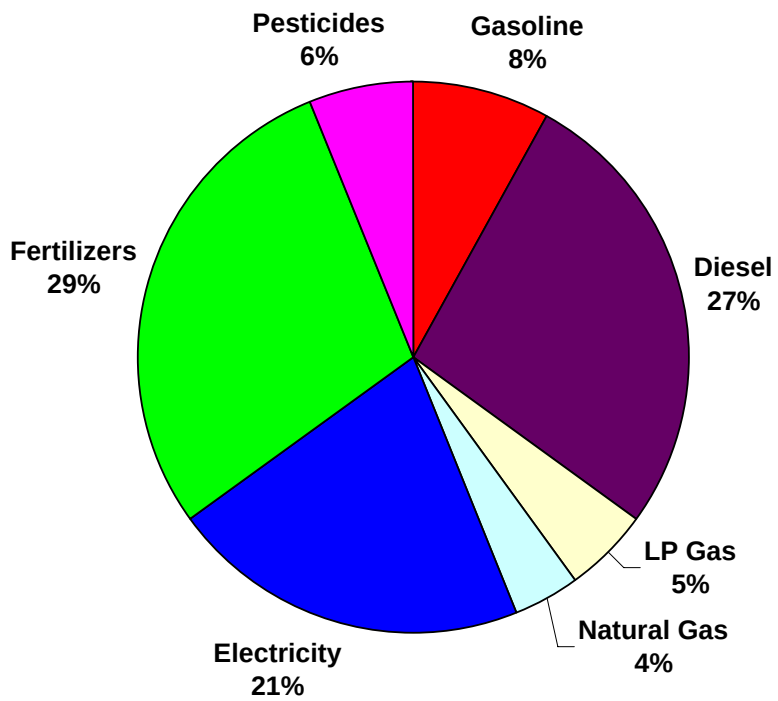


Source: USDA 2002 Census of Agriculture

Agriculture is Energy Intensive

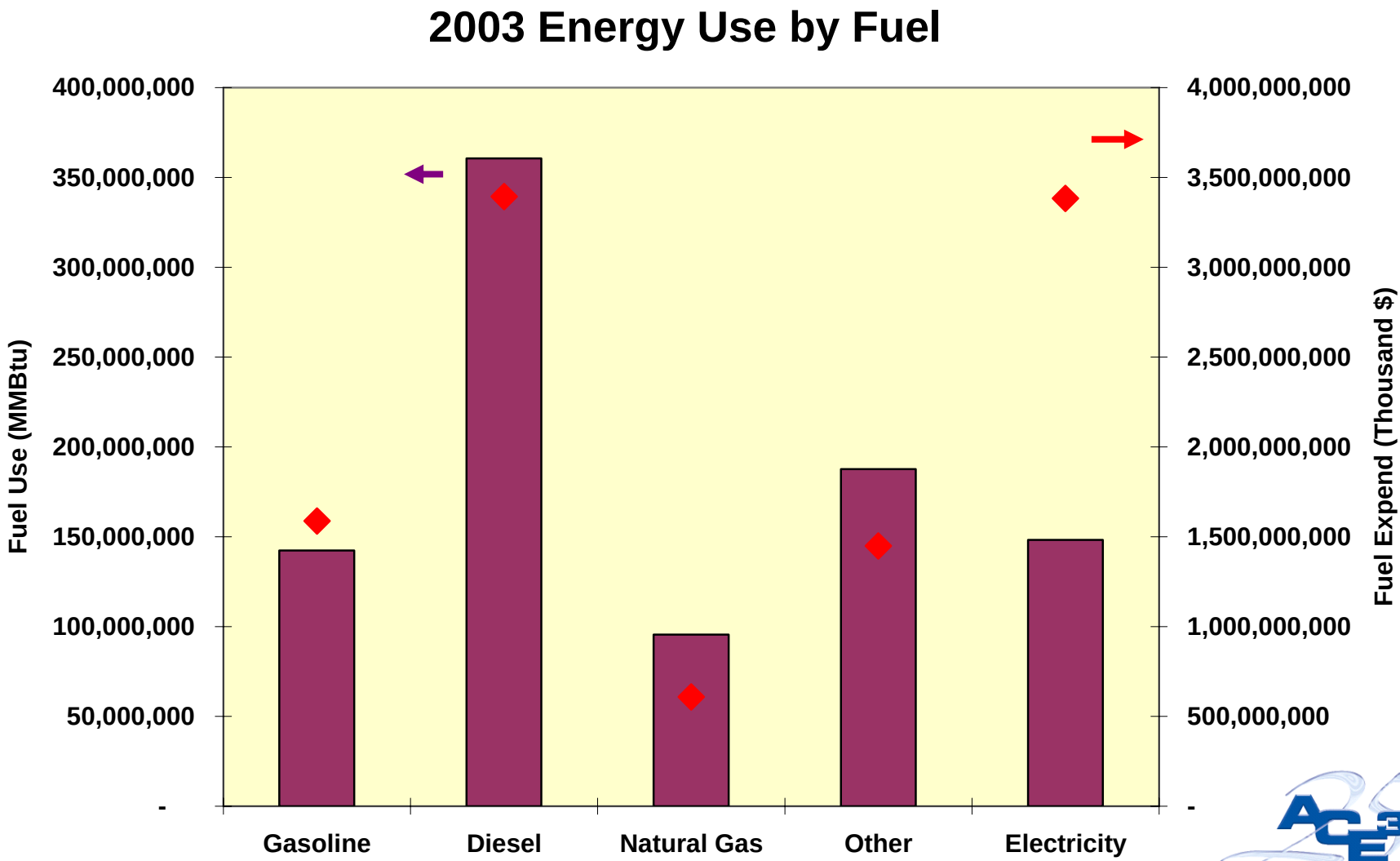
- Including energy products (e.g., ag chemicals and fertilizer) more energy intensive than most manufacturing
- Energy intensity exposes sector to energy market fluctuations
- Energy largest controllable cost
- Biggest Opportunities may be in practice

2004 Total Energy = 1.7 Quads



Source: Miranowski 2005

All Fuel Not Created Equal



Technologies Enable Crop Efficiency

- For crops, cultivation key to efficiency
- Top energy consumers:
  - Fertilizer
  - Chemicals
  - Diesel
- Minimum-till can reduce all energy inputs
- GPS-based data collection optimizes yields and minimizes energy
- Smart crop rotations reduce energy and improve yields

Animal Care Key to Efficiency

- Lighting, space conditioning, water and feed key energy inputs
- Low stress environment improves feed conversion

- Optimized environment reduces need for pharmaceuticals – maximizes returns

Water is Energy

- Water one of the most energy intensive inputs
- Sourcing and pumping electrically intensive
- Water quality growing concern
- Increasingly scarce resource

Efficiency Enables Renewables

- Renewables expensive per unit of energy
- Efficiency reduces on-site energy requirements reducing capital costs – making renewables affordable
- Efficiency frees up renewable production for resale

Biofuels Energy Intensive

- Corn production is energy intensive – efficiency important if ethanol is to be cost effective
- Shift to cellulosic may address somewhat, but efficiency remains important

- Biofuels production is energy intensive – efficiency key to profits
- Need to make good use of waste – bio-digester can deal with wastewater and supply part of energy – maximizes environmental benefits

Resources

- USDA RD & NRCS
  - 9006 grants and loans
  - Technical assistance
- Michigan Department of Environmental Quality
- Michigan State Energy Office
- Environmental Law and Policy Institute

Conclusions

- Smart energy use key to successful agricultural
- Efficiency is more than just buys light bulbs – about practices
- Significant efficiency opportunities exist in all farming operations
- Need Federal leadership – Farm Bill
- Biofuels and renewables not the solution alone – need efficiency first

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